Brucella canis Q & A for Veterinarians

1. **Why is canine brucellosis important?**
   Canine brucellosis, caused by *Brucella canis*, is a significant cause of reproductive failure, predominantly in kennels. It is also a zoonotic disease. Since *B. canis* is not reportable to the Arizona Department of Agriculture and zoonotic diseases *in pets* are not required to be reported to the health department, the prevalence is unknown in Arizona. Veterinarians can educate their clients, particularly breeders, in order to increase awareness and possibly decrease the potential spread of the disease.

2. **How is it transmitted?**
   - **Dog-to-Dog**

   B. canis is mainly found in the reproduction tract. In infected dogs, the bacteria are predominately present in the placenta, the fetus and fetal fluids, vaginal discharge and secretions, semen, milk, urine, feces, saliva and nasal and ocular secretions. Most common dog-to-dog transmission is by oronasal contact with vaginal discharge of an infected female during estrus, breeding, abortion, and whelping. Transmission occurs through contact with oral, nasal, conjunctival, and genital mucous membranes, abrasions in the skin, and via placenta. It is also commonly transmitted through semen and can be spread by infected urine for several years in chronic male cases, even after castration.

   - **Dog-to-Human**

   Dogs are the only natural reservoir of the organism. The most common way humans are infected include aerosolization of, or direct contact with, canine abortion products or infected vaginal discharge via mucous membranes or abraded skin. Infection can also occur after ingestion either by contaminated hands or by allowing an infected dog to lick around the face and mouth area. Human infection associated with infected urine and feces is unknown, but thought to be a possibility.

   Brucella canis can live in areas with high humidity and low temperatures with no sunlight for long periods of time. Therefore, it can be transmitted by contact and/or inhalation of dust and dirt. It has also been shown to live in water, aborted fetuses, feces, equipment and clothing for several months.

3. **What are the symptoms?**
   B. canis is commonly known as a reproductive disease with the most common symptom of abortion between the 45^{th}-59^{th} days of gestation. Other common reproduction symptoms include failure to conceive in an otherwise healthy bitch, infertile males with abnormal semen quality, testicle atrophy and scrotal dermatitis. Non-specific symptoms for both sexes include; lethargy, loss of libido, premature aging, and generalized lymph node enlargement.

4. **How do I diagnosis *B. canis*?**
   Serology is most commonly used to diagnosis *Brucella* species but these tests are imprecise because they test for surface antigens that cross-react with antibodies of non-pathogenic bacteria. Most common serologic tests:
   - **Rapid Slide Agglutination Test (RSAT)**:
     i. negative result is strongly negative
     ii. positive result is not sufficient, only 40% of positives are truly positive
   - **Tube Agglutination (TAT) and Agar Gel Immunodiffusion (AGIDcwa)Tests**:
     iii. commonly have false positive reactions
     iv. difficult to interpret results with early sera and sera from chronically infected dogs
   - **Indirect fluorescent antibody test (IFAT or IFA)**:
     i. used by several diagnostic labs in the U.S.
     ii. accuracy is unknown, but a large number of false positives is suspected

   **** Positive results from the above tests should be should be confirmed by more specific tests, such as listed below:

   - **M-RSAT:**
     i. a Rapid Slide Agglutination Test that uses a mutant strain ("M" strain of *B. canis*)
     ii. this test has a high specificity, but results are still questionable
   - **AGIDcpa**:
     i. specifically uses cytoplasmic protein antigens
     ii. the protein antigens are highly specific for Brucella and are effective in distinguishing between infected and non-infected dogs.

- **Blood culture**
  i. Should always be performed when disease is suspected; useful for confirming infection. Bacteremia detectable 2-4 weeks after exposure, usually persists for more than 6 months[2]
  ii. If negative, multiple blood samples over time should be collected as bacteremia is undulating
- **PCR**
  i. Can be utilized to identify *Brucella* colonies isolated from blood cultures and to detect *Brucella* organisms in blood

It is important to note that further testing should always be performed when *B. canis* is suspected. **Only a definitive diagnosis can be made by culture or PCR analysis.** As mentioned above under blood culture, bacteremia is detectable 2-4 weeks after exposure and persists for 6+ months. *It has been noted that many labs are unfamiliar with the interpretation of lab results, which has frequently resulted in the destruction of non-infected dogs solely based on a false-positive result from an agglutination test.*

Please be aware that *Brucella* species are highly contagious in a laboratory setting. Therefore, it is imperative that you label the specimen as a suspect for brucellosis and call the lab for further details.

5. How do I treat for *Brucellosis canis*?

Treatment is not recommended for dogs in breeding kennels or for dogs that cannot be isolated and given antibiotic therapy, as they may continue to be a source of infection for other dogs and humans. Treatment is expensive as several weeks of antibiotic therapy are required and not guaranteed. Relapse is common, even after continual use of antibiotics. Spaying/neutering of the dog can reduce transmission risk, but this method has not been proven to decrease risk of infection to others and it does not remove the *B. canis* organism from the body. Treatment is especially difficult in male dogs as the prostate gland and epididymis are chronically infected. The only proven method for eradication in kennels is to test all dogs and eliminate the confirmed positives. Current recommendations for treating spayed/neutered pet dogs consist of a 4-6 week course of doxycycline coupled with gentamycin. Chances of successful treatment are greater the earlier the infection is treated. Post treatment monitoring should include blood cultures one month and 6 months after therapy, three times every other day. The repeat blood draws are necessary due to fluctuating bacteremia.

6. What are the preventative control measures and recommendations?

There is no vaccine available for *B. canis* at this time. The best preventative measures include: yearly testing of all breeding stock, test all dogs introduced for breeding, only breed non-infected dogs, clean and disinfect areas, line yard with pea rocks to prevent moist areas, use gloves when whelping, and refrain from placing infected male dogs in pet homes as they can shed *Brucella* in urine for long periods of time.

7. What are the public health implications?

Dogs are the only natural reservoir for *B. canis* and humans are relatively resistant to *B. canis* infection. Although *B. canis* is not considered to be a significant zoonosis under normal circumstances, it is still pathogenic to humans and can cause significant illness. Immunocompromised owners including pregnant owners and children may be at greater risk for infection and severity of disease. Reproductive effects in humans are unknown, as well as the true incidence of *B. canis* in pets and humans alike due to lack of suspicion and insufficient testing. Good breeding management, improving environmental controls, testing of breeding dogs and removal of those infected dogs can assist in the reduction of *B. canis* in kennels.

References

[1] Shin S, Carmichael LE. Nov 1999. *Canine Brucellosis Caused by Brucella Canis*. Recent Advances in Canine Infectious Disease.

[2] Scheftel J. Nov 2003. *Brucella canis: Potential for Zoonotic Transmission*. Compendium. Vol 25 (11) 846-852.

[3] Wallach J, Guillermo G. Baldi P, et al. Jan 2004. *Human Infection with M-Strain Brucella canis*. Emerging Ifectious Diseases. Vol 10 (1) 146-148.

[4] Canine Brucellosis: *Brucella canis*. 2007. The Center for Food Sercurity and Public Health, Iowa State University, College of Veterinary Medicine 1-4.
http://www.cfsph.iastate.edu/Factsheets/pdfs/brucellosis_canis.pdf

For further information on *Brucella canis*, please refer to the references above, or contact the Arizona Department of Health Services at 602-364-4562.